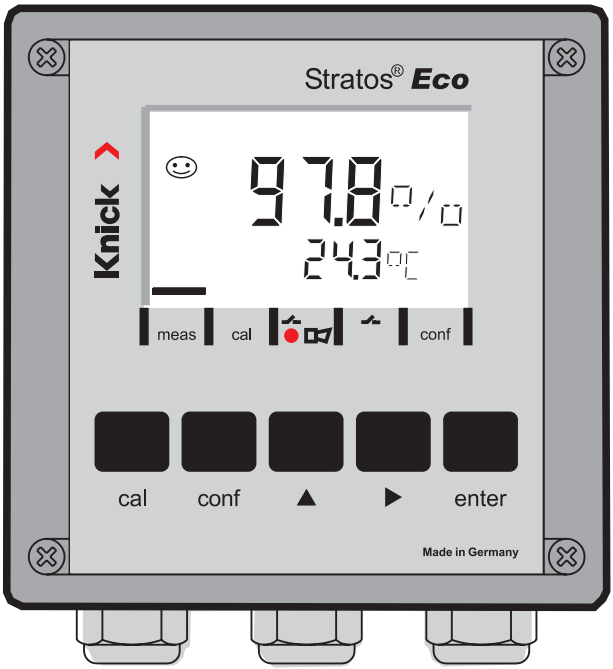
Stratos® Eco 2405 Oxy

User Manual



Latest Product Information:

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Warranty
Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors, fittings, and accessories: 1 year.
Subject to change without notice.

Return of Products Under Warranty
Please contact our Service Team before returning a defective device.
Ship the cleaned device to the address you have been given.
If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

Disposal
Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

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Table of Contents

Safety Information **5**
Intended Use 7
Registered Trademarks 7
CD-ROM 8
Safety Instructions 8
Quickstart Guides 8

Overview of Stratos Eco 2405 Oxy **9**

Assembly **10**
Package Contents 10
Mounting Plan 11
Pipe Mounting, Panel Mounting 12

Installation and Connection **14**
Installation Instructions 14
Terminal Assignments 14

Wiring Example **17**
Protective Wiring of Relay Outputs 18

User Interface and Display **20**

Operation: Keypad **22**

Safety Functions **23**
Sensocheck, Sensoface Sensor Monitoring 23
GainCheck Device Self-Test 23
Automatic Device Self-Test 23
Hold Mode 24

Configuration **26**
Menu Structure of Configuration 27
Overview of Configuration Steps 28
Output 1 30
Output 2 38
Correction 44
Calibration Mode 46

Table of Contents

Alarm Settings 48
Limit Function 50
Controlling a Rinsing System 52
Connecting a Rinsing System 53

Parameters 54
Factory Settings of Parameters 54
Parameters – Individual Settings 56

Calibration 58
Calibration to Percent Saturation (SAT), in Water 60
Calibration to Concentration (Conc), in Air 62
Zero Calibration 64
Product Calibration 66

Temp Probe Adjustment 69

Measurement 69

Diagnostics Functions 70

Error Messages (Error Codes) 72

Calibration Error Messages 74

Operating States 75

Sensoface 77

Appendix 81
Product Line and Accessories 81
Specifications 82
Approvals – Canada 88
CSA Control Drawing 90

Index 92

Passcodes 96

Safety information –
Be sure to read and observe the following instructions!
The device has been manufactured using state of the art technology and it complies with applicable safety regulations.
When operating the device, certain conditions may nevertheless lead to danger for the operator or damage to the device.

Caution!
Commissioning must be carried out by trained experts.
Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation.

The protection is likely to be impaired if, for example:
- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures above 70°C
- after severe transport stresses

Before recommissioning the device, a professional routine test in accordance with EN 61010-1 must be performed. This test should be carried out at the manufacturer's factory.

Caution!
Before commissioning, make sure that the transmitter may be connected with the other equipment.

Intended Use

Stratos Eco 2405 Oxy is used for dissolved oxygen and temperature measurement in biotechnology, pharmaceutical industry, as well as in the field of environment, food processing, and sewage treatment.
The sturdy molded enclosure can be fixed into a control panel or mounted on a wall or at a post.
The protective hood provides additional protection against direct weather exposure and mechanical damage.
The device has been designed for application with amperometric sensors, e.g. Knick SE 703 / SE 706. It provides two current outputs (for transmission of measured value and temperature, for example), two contacts, and a universal power supply 24 ... 230 V AC/DC, AC: 45 ... 65 Hz.

Registered Trademarks

The following names are registered trademarks. For practical reasons they are shown without trademark symbol in this manual.
Stratos®
Sensocheck®
Sensoface®
Calimatic®
GainCheck®

Provided Documentation

CD-ROM

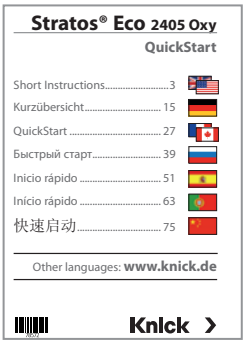
Complete documentation:

- User manuals
- Safety instructions
- Quickstart guides

Safety Instructions

In official EU languages and others.

- FM / CSA and Control Drawings
- EC Declarations of Conformity

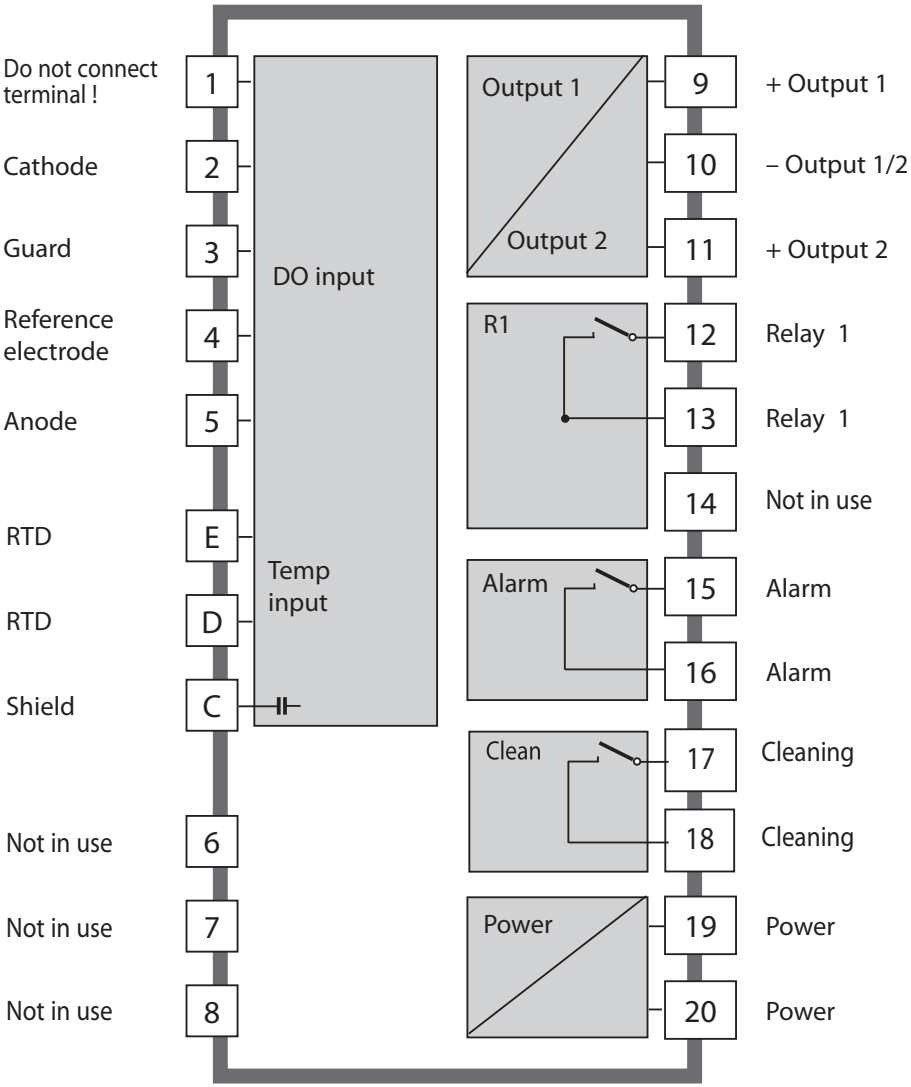


Quickstart Guides

In German, English, French, Russian, Spanish, Portuguese and Chinese.
More languages on CD-ROM and on our website: www.knick.de

- Installation and Commissioning
- Operation
- Menu structure
- Calibration
- Error messages and recommended actions

Overview of Stratos Eco 2405 Oxy

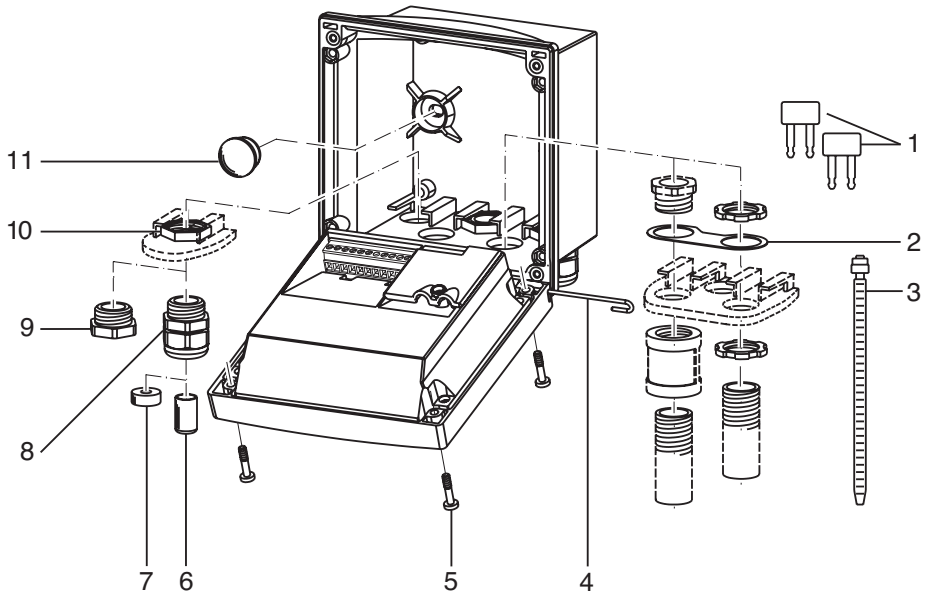


Assembly

Package Contents

Check the shipment for transport damage and completeness.
The package should contain:

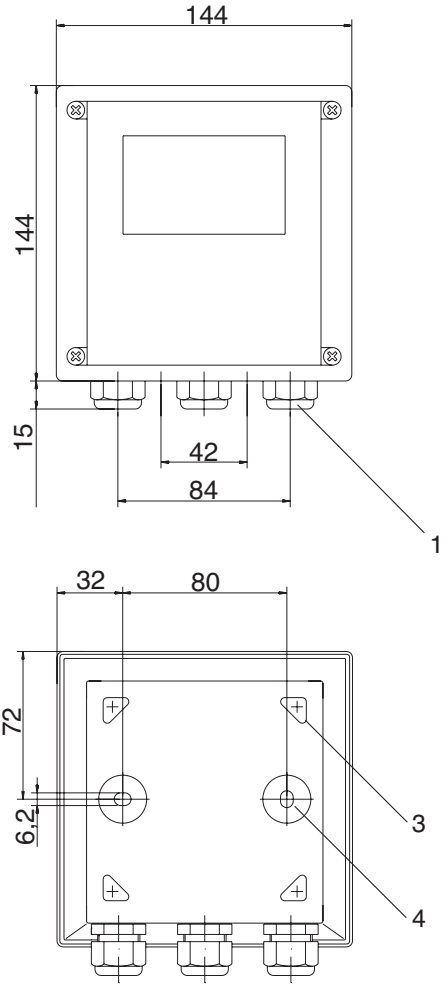
- Front unit
- Rear unit
- Bag containing small parts
- CD-ROM with documentation
- Specific test report
- Passcode sticker



1 Jumper (2 x)
2 Washer (1 x), for conduit mounting: Place washer between enclosure and nut
3 Cable tie (3 x)
4 Hinge pin (1 x), insertable from either side
5 Enclosure screw (4 x)
6 Sealing insert (1 x)
7 Rubber reducer (1 x)
8 Cable gland (3 x)
9 Filler plug (3 x)
10 Hexagon nut (5 x)
11 Sealing plug (2 x), for sealing in case of wall mounting

Fig.: Assembling the enclosure

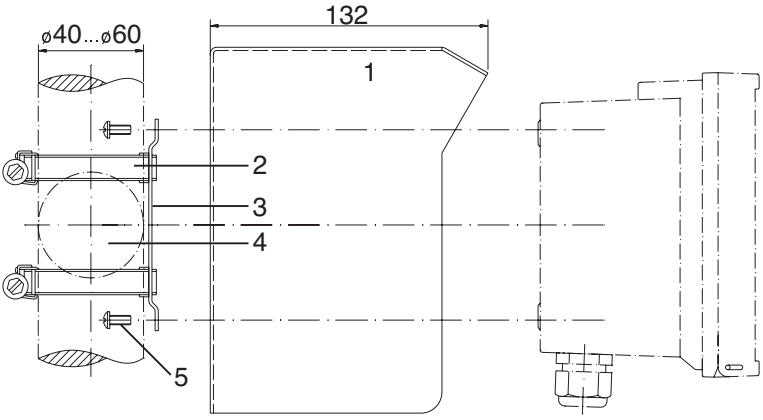
Mounting Plan



1 Cable gland (3 x)
2 Knockouts for cable gland or 1/2“ conduit, ø 21.5 mm (2 knockouts) Conduits not included!
3 Knockout for pipe mounting (4 x)
4 Knockout for wall mounting (2 x)

Fig.: Mounting plan (All dimensions in mm!)

Pipe Mounting, Panel Mounting



1 ZU 0276 protective hood (if required)
2 Hose clamp with worm gear drive to DIN 3017 (2 x)
3 Pipe-mount plate (1 x)
4 For vertical or horizontal posts or pipes
5 Self-tapping screw (4 x)

Fig.: ZU 0274 pipe-mount kit (All dimensions in mm!)

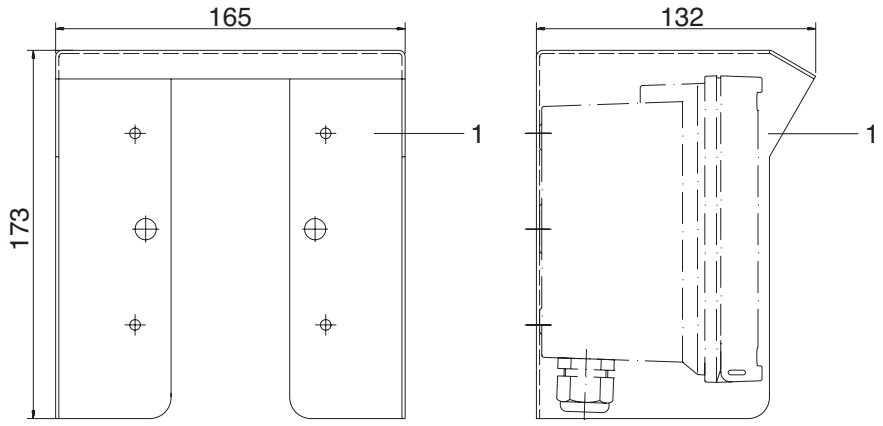
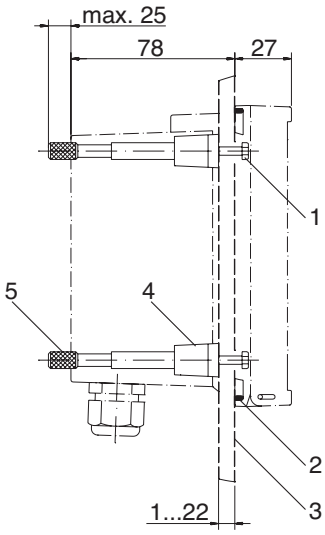


Fig.: ZU 0276 protective hood for wall and pipe mounting
(All dimensions in mm!)



1 Screw (4 x)
2 Gasket (1 x)
3 Control panel
4 Span piece (4 x)
5 Threaded sleeve (4 x)

Panel cut-out
138 x 138 mm (DIN 43700)

Fig.: ZU 0275 panel-mount kit (All dimensions in mm!)

Installation and Connection

Installation Instructions

Caution!

- Installation of the Stratos must be carried out by trained experts in accordance with this user manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation.
- Be sure not to notch the conductor when stripping the insulation.
- Before connecting the device to the power supply, make sure that its voltage lies within the range 20.5 to 253V AC/DC.
- All parameters must be set by a system administrator prior to commissioning.

The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).

Caution!
Additional safety precautions have to be taken for operation in hazardous locations CSA (CLI, DIV2, GPA,B,C,D T4 and Ex nA IIC T4) (see Appendix: Approvals)!

Terminal Assignments

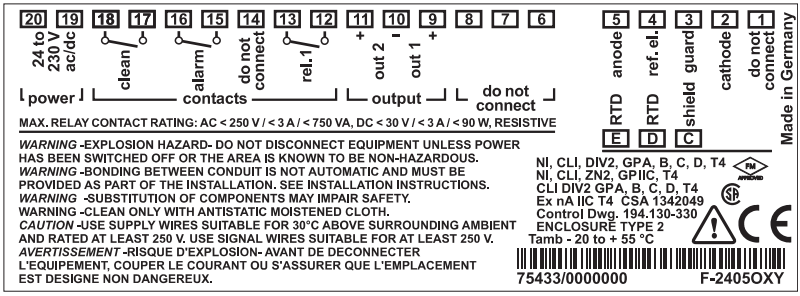
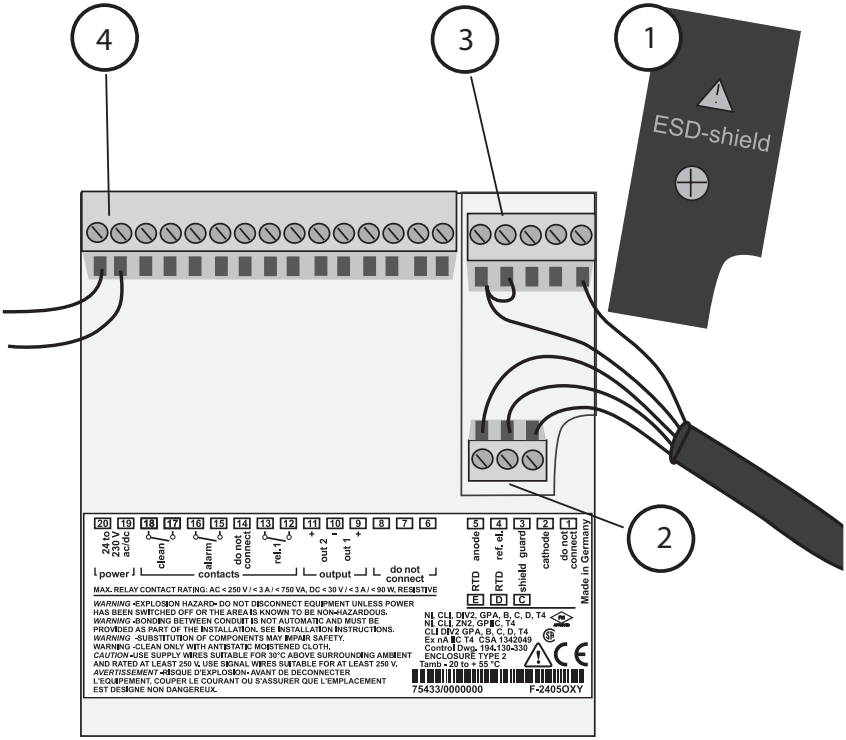

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6
24 to 230 V ac/dc
clean
alarm
do not connect
rel. 1
+
out 2
-
out 1
+
power
contacts
output
do not connect
MAX. RELAY CONTACT RATING: AC < 250 V / < 3 A / < 750 VA, DC < 30 V / < 3 A / < 90 W, RESISTIVE
5 4 3 2 1
anode
ref. el.
guard
cathode
do not connect
RTD
RTD
shield
E D C
Made in Germany
WARNING -EXPLOSION HAZARD- DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
WARNING -BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.
WARNING -SUBSTITUTION OF COMPONENTS MAY IMPAIR SAFETY.
WARNING -CLEAN ONLY WITH ANTISTATIC MOISTENED CLOTH.
CAUTION -USE SUPPLY WIRES SUITABLE FOR 30°C ABOVE SURROUNDING AMBIENT AND RATED AT LEAST 250 V. USE SIGNAL WIRES SUITABLE FOR AT LEAST 250 V.
AVERTISSEMENT -RISQUE D'EXPLOSION- AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.
NI, CLI, DIV2, GPA, B, C, D, T4
NI, CLI, ZN2, GPIIC, T4
CLI DIV2 GPA, B, C, D, T4
Ex nA IIC T4 CSA 1342049
Control Dwg. 194.130-330
ENCLOSURE TYPE 2
Tamb - 20 to + 55 °C
75433/0000000
F-2405OXY

Fig.: Stratos Eco 2405 Oxy terminal assignments


4
3
1
ESD-shield
2
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6
24 to 230 V acdc
clean
alarm
do not connect
rel.1
out 2
out 1
power
contacts
output
do not connect
5 4 3 2 1
anode
ref. el.
shield guard
cathode
do not connect
RTD
RTD
E D C
Made in Germany
MAX. RELAY CONTACT RATING: AC < 250 V / < 3 A / < 750 VA, DC < 30 V / < 3 A / < 90 W, RESISTIVE
WARNING -EXPLOSION HAZARD- DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
WARNING -BONDING BETWEEN CONDUIT IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. SEE INSTALLATION INSTRUCTIONS.
WARNING -SUBSTITUTION OF COMPONENTS MAY IMPAIR SAFETY.
WARNING -CLEAN ONLY WITH ANTISTATIC MOISTENED CLOTH.
CAUTION -USE SUPPLY WIRES SUITABLE FOR 30°C ABOVE SURROUNDING AMBIENT AND RATED AT LEAST 250 V, USE SIGNAL WIRES SUITABLE FOR AT LEAST 250 V.
AVERTISSEMENT -RISQUE D'EXPLOSION- AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.
NI, CLI, DIV2, GPA, B, C, D, T4
NI, CLI, ZN2, GPIIC, T4
CLI DIV2 GPA, B, C, D, T4
Ex nA IIC T4 CSA 1342049
Control Dwg. 194,130-330
ENCLOSURE TYPE 2
Tamb = 20 to + 55 °C
75433/0000000
F-2405OXY

1 ESD shield covering the signal inputs (Screw off for assembly)
Note: The cable shield must end under the ESD shield. (Cut lines if required.)
2 Terminals for temperature probe
3 Terminals for sensor
4 Power supply connection

Fig.: Information on installation, rear side of device

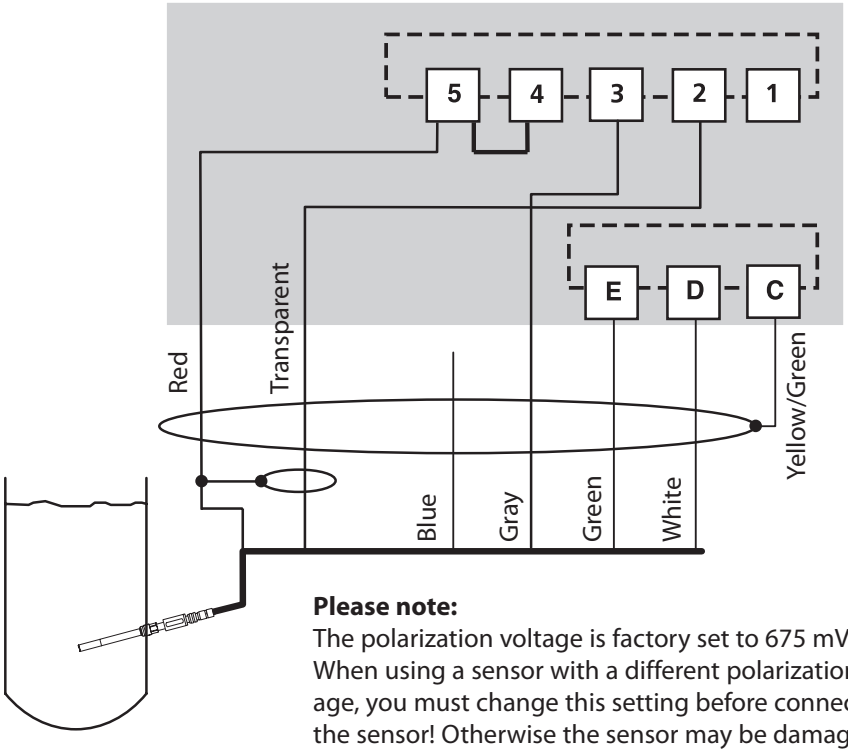
Division 2 Wiring

FM

The connections to the device must be installed in accordance with the National Electric Code (ANSI NFPA 70) Division 2 hazardous (classified) location non-incendive wiring techniques.

Sensors with Connection via VP Cable

Stratos Eco 2405 Oxy



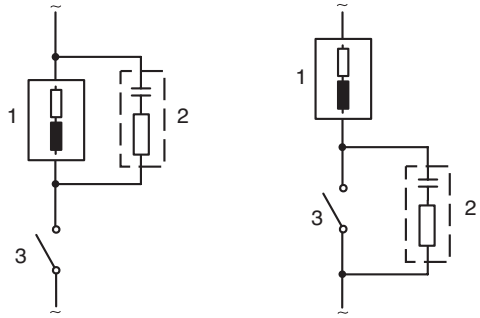
Please note:
The polarization voltage is factory set to 675 mV. When using a sensor with a different polarization voltage, you must change this setting before connecting the sensor! Otherwise the sensor may be damaged!

Connection	Terminal	SE 703/SE 706 sensor VP cable (e.g. ZU 0313)
	1	Do not connect!
cathode	2	Transparent (coax core)
guard	3	Gray
ref. el.	4	(Jumper 4-5)
anode	5	Red (coax shield)
RTD	E	Green
RTD	D	White
shield	C	Yellow/Green

Protective Wiring of Relay Outputs

Protective Wiring of Relay Contacts

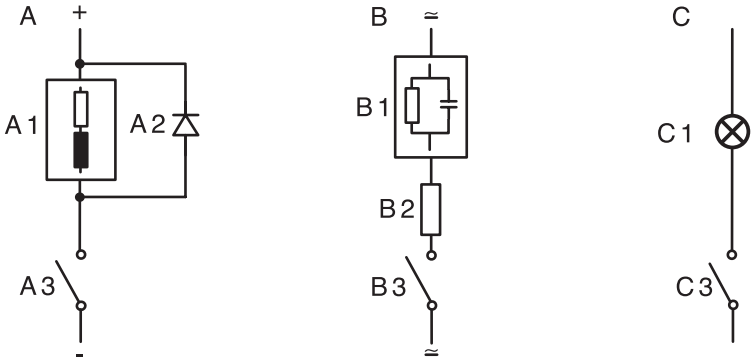
Relay contacts are subjected to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.



AC applications with inductive load

1 Load
2 RC combination, e.g. RIFA PMR 209
Typical RC combinations for 230 V AC:
Capacitor 0.1 µF / 630 V Resistor 100 ohms / 1 W
3 Contact

Typical Protective Wiring Measures



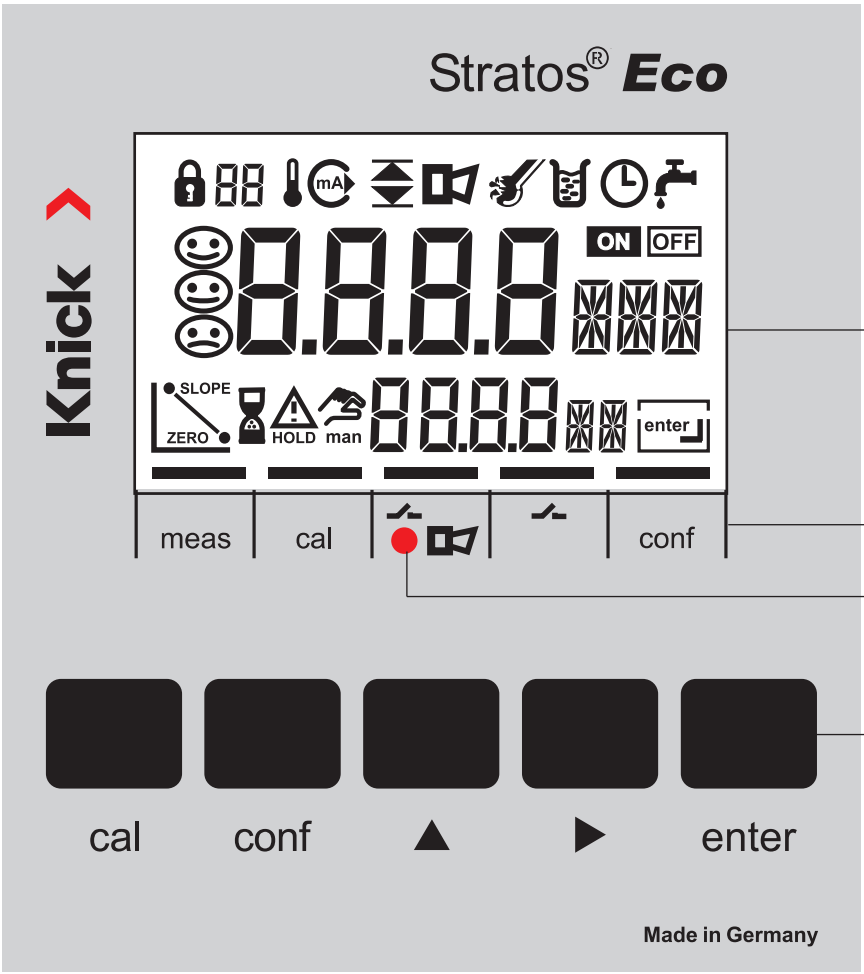
A: DC application with inductive load
B: AC/DC applications with capacitive load
C: Connection of incandescent lamps

A1 Inductive load
A2 Free-wheeling diode, e.g. 1N4007 (Observe polarity)
A3 Contact
B1 Capacitive load
B2 Resistor, e.g. 8 Ω / 1 W at 24 V / 0.3 A
B3 Contact
C1 Incandescent lamp, max 60 W / 230 V, 30 W / 115 V
C3 Contact

Warning!
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

User Interface and Display

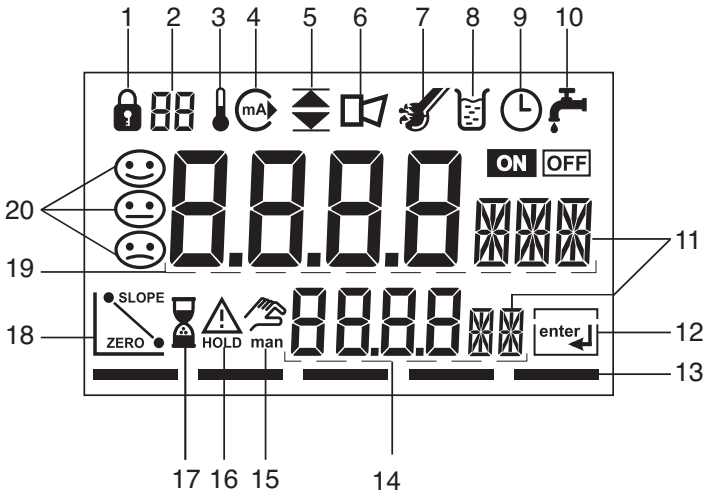
User Interface



1 Display
2 Mode indicators (no keys), from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Cleaning contact
- Configuration mode

3 Alarm LED
4 Keypad

Display



1 Passcode entry
2 Not in use
3 Temperature
4 Current output
5 Limit values
6 Alarm
7 Sensocheck
8 Calibration
9 Interval/response time
10 Cleaning contact
11 Measurement symbol
12 Press **enter** to proceed
13 Bar for identifying the device status, above mode indicators, from left to right:
- Measuring mode
- Calibration mode
- Alarm
- Not in use
- Configuration mode

14 Secondary display
15 Manual temperature specification
16 Hold mode active
17 Waiting time running
18 Sensor data
19 Main display
20 Sensoface

Operation: Keypad

cal	Start, exit calibration
conf	Start, exit configuration
▸	• Select digit position (selected position blinks) • Menu navigation
▲	• Edit digit • Menu navigation
enter	• Calibration: Continue in program sequence • Configuration: Confirm entries, next configuration step • Measuring mode: Display output current

cal → **enter**	Cal Info: Display of zero point and slope
conf → **enter**	Error Info: Display of last error message
▸ + ▲	Start GainCheck device self-test

Sensocheck, Sensoface Sensor Monitoring

Sensocheck continuously monitors the sensor and its wiring. Sensocheck can be switched off (Configuration, page 48).

Sensoface provides information on the sensor condition. The slope and response time during calibration are evaluated. The three Sensoface indicators provide the user with information on wear and required maintenance of the sensor.

GainCheck Device Self-Test

A display test is carried out, the software version is displayed, and the memory and measured-value transfer are checked.

Start GainCheck device self-test: ▸ + ▲

Automatic Device Self-Test

The automatic device self-test checks the memory and measured-value transfer. It runs automatically in the background at fixed intervals.

Hold Mode

Display:

The Hold mode is a safety state during configuration and calibration. Output current is frozen (Last) or set to a fixed value (Fix). Alarm and limit contacts are disabled.
If the calibration or configuration mode is exited, the device remains in the Hold mode for safety reasons. This prevents undesirable reactions of the connected peripherals due to incorrect configuration or calibration. The measured value and "HOLD" are displayed alternately.
The device only returns to measuring mode after **enter** is pressed and 20 seconds have passed.

Configuration mode is also exited automatically 20 minutes (timeout) after the last keystroke. The device returns to measuring mode.

Timeout is not active during calibration.

Behavior of output signal:

Last: The output current is frozen at its last value.
Recommended for short configuration procedures.
The process should not change decisively during configuration.
Changes are not noticed with this setting!

Fix: The output current is set to a value that is noticeably different from the process value in order to signal the control system that the device is being worked at.

See Configuration page 36.

Alarm

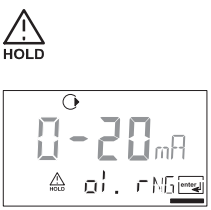
Alarm delay is 10 seconds.
During an error message the alarm LED blinks.

Error messages can also be signaled by a 22 mA output current.

The alarm contact is activated by alarm or power failure,
see also page 49.

Configuration

In the Configuration mode you set the device parameters.

Activation	**conf**	Activate using **conf**
		Enter passcode "1200" Edit parameter using ▸ and ▴, confirm/proceed using **enter**. (Exit by pressing **conf**, then **enter**.)
HOLD During configuration the device remains in the Hold mode.	 HOLD icon	The output current is frozen (at its last value or at a preset fixed value, depending on the configuration), limit and alarm contacts are inactive. Sensoface is off, "Configuration" mode indicator is on.
Input errors		The configuration parameters are checked during the input. In the case of an incorrect input "Err" is displayed for approx. 2 sec. The incorrect parameters cannot be stored. Input must be repeated.
Exit	**conf** **enter**	Exit by pressing **conf**. The measured value and Hold are displayed alternately, "enter" blinks. Press **enter** key to exit the Hold mode. The measured value is displayed. The output current remains frozen for another 20 sec (HOLD icon on, "hourglass" blinks).

Menu Structure of Configuration

The configuration steps are assigned to different menu groups.
Using the arrow keys, you can jump between the individual menu groups.
Each menu group contains menu items for setting the parameters.
Pressing **enter** opens a menu item.
The values are edited using the arrow keys.
Pressing **enter** confirms/saves the settings.
Return to measurement: Press **conf**.

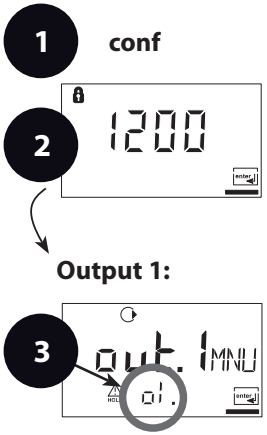
Select menu group	Menu group	Code	Display	Select menu item
	Output 1	o1.		
		Menu item 1		enter
		Menu item 2		enter
		⋮		enter
		Menu item ...		enter
	Output 2	o2.		
	Correction	Co.		
	Calibration mode	CA.		
	Alarm settings	AL.		
	Relay	rL.		Previous menu group:
	Rinsing probes	Pb.		

Overview of Configuration Steps

Code	Menu	Selection
out1	**Output 1**	
o1.SnSR	Select sensor type	Standard (Type A) / Sensors with higher current (Type B)
o1.UnIT	Select saturation / concentration	% / mg/l, ppm
o1.rNG	Select current range	0-20 mA / 4-20 mA
o1. 4mA	Enter current start	xxxx
o1.20mA	Enter current end	xxxx
o1.FtME	Time constant of output filter	xxxx sec
o1.FAIL	22 mA signal in the case of error	ON / OFF
o1.HoLD	Signal behavior during HOLD	Last / Fix
o1.FIX	Enter fixed value	xxx.x mA
out2	**Output 2**	
o2.UnIT	Select temperature unit	°C / °F
o2.rTD	Select temperature probe	22NTC / 30NTC
o2.rNG	Select current range	0-20 mA / 4-20 mA
o2. 4mA	Enter current start	xxx.x
o2.20mA	Enter current end	xxx.x
o2.FtME	Time constant of output filter	xxxx sec
o2.FAIL	22 mA signal for temp error	ON / OFF
o2.HoLD	Signal behavior during HOLD	Last / Fix
	Enter fixed value	xxx.x mA
Corr	**Correction**	
Co.UPOL	Enter polarization voltage	0675 mV / xxxx mV
Co.CAp	Enter factor for membrane temperature compensation	Default: 01.00
Co.UnIT	Select pressure unit	bar / kPa / PSI
Co.PrES	Select process pressure correction	x.xxx bar / 1.013 bar
Co.SAL	Enter salinity correction	xx.xx mg/l

Code	Menu	Selection
CAL	**Calibration mode**	
Ca.MOD	Select saturation / concentration	SAt / Conc
CA.tiME	Enter cal timer interval	xxxx h
ALrt	**Alarm settings**	
AL.SnSO	Select Sensocheck	ON / OFF
rLAY	**Relay 1: Limit**	
L1.FCT	Select contact function	Lo / Hi
L1.tYP	Select contact response	N/O / N/C
L1.LEVL	Enter setpoint	xxxx
L1.HYS	Enter hysteresis	xxxx
L1.dLY	Enter delay	xxxx SEC
PrbE	**Rinsing probes**	
Pb.InTV	Rinse interval	000.0 h
Pb.rins	Rinse duration	xxxx SEC
Pb.typ	Contact response	N/C / N/O

Output 1
Select sensor type. Process variable



1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit using arrow keys (see page 31).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

enter →

o1.SnSR	Select sensor type*
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

4 **enter**

5 **conf** **enter**

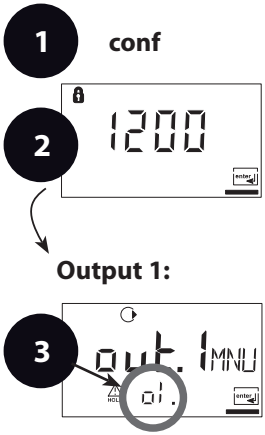
* Sensor type		Sensor cap	Sensor current in air (25 °C)	Detection limit
A	SE 703 SE 706	VP VP	40 ... 110 nA 50 ... 110 nA	0.03 ppm 0.006 ppm
B (sensors with higher current)			290 ... 500 nA	

Note: Stratos Eco 2405 Oxy has as device a resolution of 0.01 ppm.

Code	Display	Action	Choices
o1.		Select sensor type A / B (see table on left-hand side) Select using ▸ . Press **enter** to proceed.	**Type A** (SE 703/ SE 706) Type B (sensors with higher current)
	 	Select process variable (valid for all following settings): • SAt: Saturation (%) • Conc: Concentration (mg/l or ppm) Select using ▸ . Press **enter** to proceed.	**%** mg/l ppm

Note: Characters represented in gray are blinking and can be edited.

Output 1
Output current range, current start, current end



1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit using arrow keys (see page 33).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

enter →

4

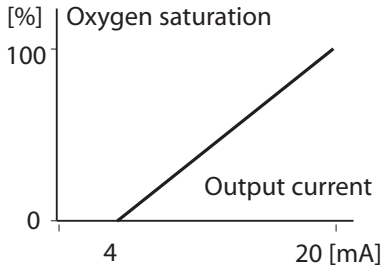
o1.SnSR	Select sensor type	**enter**
o1.UnIT	Select process variable	
o1.rNG	Select 0-20 / 4-20 mA	
o1.4mA	Enter current start	
o1.20mA	Enter current end	
o1.FtME	Set output filter	
o1.FAIL	22 mA for error	
o1.HoLD	HOLD mode	

5 **conf** **enter**

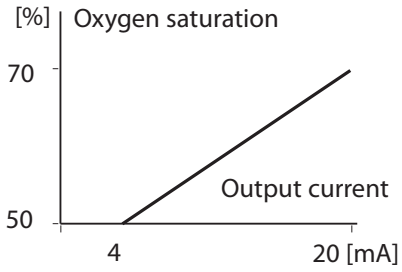
Code	Display	Action	Choices
o1.		Set output current range Select using ▸ key, press **enter** to proceed.	**4-20 mA** (0 - 20 mA)
		Current start Enter lower end of scale. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**000.0 %** (mg/l, ppm)
		Current end Enter upper end of scale, depending on process variable selected (saturation or concentration) Press **enter** to proceed.	**200.0 %** (mg/l, ppm)

Assignment of Measured Values: Current Start and Current End

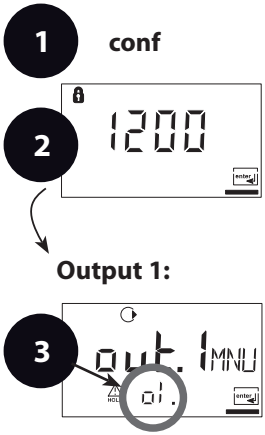
Example 1: Range 0 ... 100 %



Example 2: Range 50 ... 70%.
Advantage: Higher resolution in range of interest



Output 1
Time constant of output filter



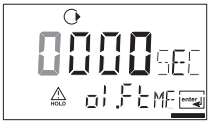
1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit using arrow keys (see page 35).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

enter →

o1.SnSR	Select sensor type
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

4 **enter**

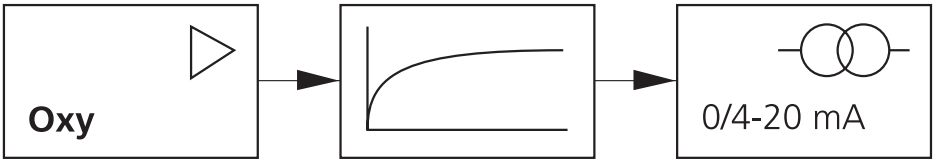
5 **conf** **enter**

Code	Display	Action	Choices
o1.		Time constant of output filter Default setting: 0 s (inactive). To specify a time constant: Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**0 sec** 0 ... 120 sec

Time Constant of Output Filter (Attenuation)

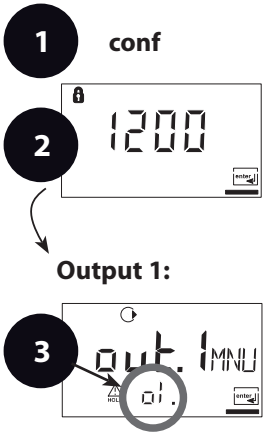
To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 sec.
If the time constant is set to 0 sec, the current output follows the input.

Please note:
The filter only acts on the current output, not on the display or the limit value!



Time constant 0 ... 120 sec

Output 1
Output current during Error and HOLD



1 Press **conf** key.
2 Enter passcode **1200**.
3 **Output 1** menu group is displayed. All items of this menu group are indicated by the "o1." code.
4 Press **enter** to select menu, edit using arrow keys (see page 37).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

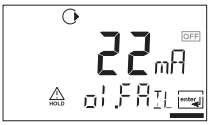
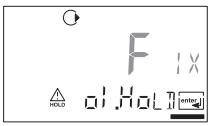
enter →

4

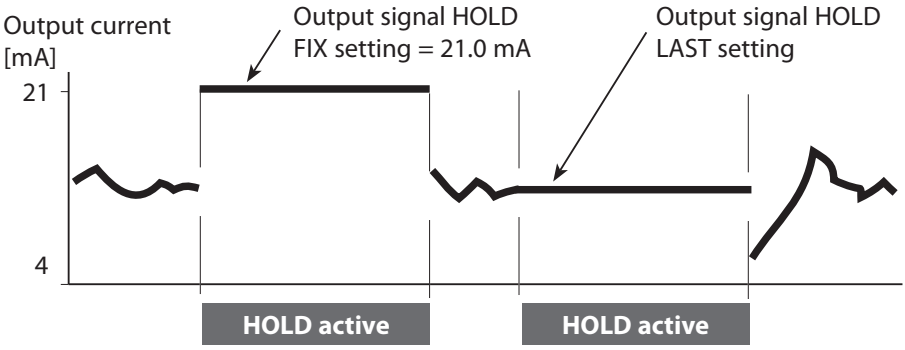
o1.SnSR	Select sensor type
o1.UnIT	Select process variable
o1.rNG	Select 0-20 / 4-20 mA
o1.4mA	Enter current start
o1.20mA	Enter current end
o1.FtME	Set output filter
o1.FAIL	22 mA for error
o1.HoLD	HOLD mode

enter

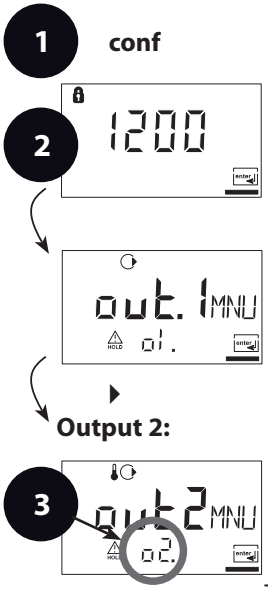
5 **conf** **enter**

Code	Display	Action	Choices
o1.		22 mA signal for error message Select using ▸ key, press **enter** to proceed.	**OFF** (OFF / ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output Select using ▸ key, press **enter** to proceed.	**LAST** (LAST / FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD Select position using ▸ key and edit number using ▴ key. Press **enter** to proceed.	**21.0 mA** (00.0 ... 21.0 mA)

Output Signal During HOLD:



Output 2
Temperature unit and probe, output current



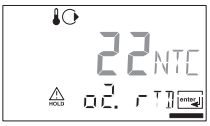
1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit using arrow keys (see page 39).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

4

o2.UnIT	Select °C/°F
o2.rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

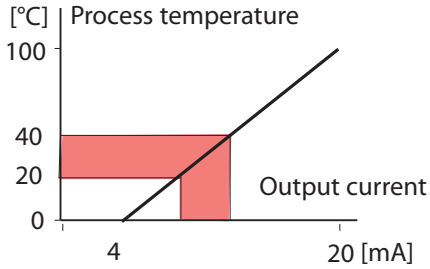
enter

5 **conf** **enter**

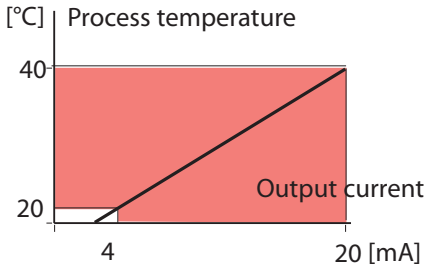
Code	Display	Action	Choices
o2.		Specify temperature unit Select using ▸ key, press **enter** to proceed.	**°C** (°C / °F)
		Select temperature probe Select using ▸ key, press **enter** to proceed.	**22NTC** (30NTC)
		Select output current range Select using ▸ key, press **enter** to proceed.	**4 - 20 mA** (4 - 20 mA/ 0 - 20 mA)
		Current start: Enter lower end of scale. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**000.0 °C** (xxx.x °C)
		Current start: Enter upper end of scale. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**100.0 °C** (xxx.x °C)

Process Temperature: Current Start and Current End

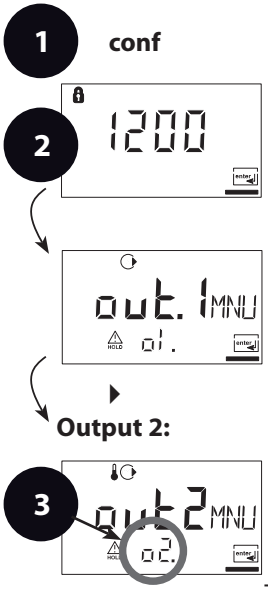
Example 1: Range 0 ... 100 °C



Example 2: Range 20 ... 40 °C
Advantage: Higher resolution in range of interest



Output 2
Time constant of output filter



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit using arrow keys (see page 41).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

4

o2.UnIT	Select °C/°F
o2. rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

enter

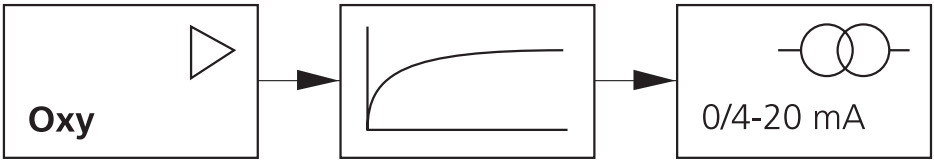
5 **conf** **enter**

Code	Display	Action	Choices
o2.		Time constant of output filter Default setting: 0 sec (inactive). To specify a time constant: Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**0 sec** (0 ... 120 sec)

Time Constant of Output Filter

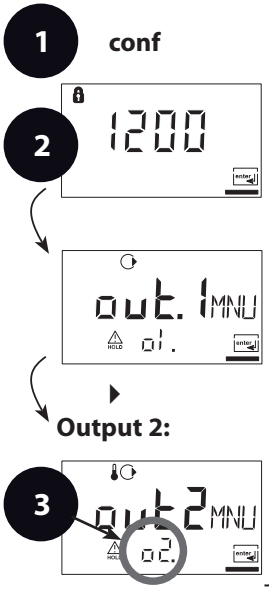
To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached.
The time constant can be set from 0 to 120 sec.
If the time constant is set to 0 sec, the current output follows the input.

Please note:
The filter only acts on the current output, not on the display!



Time constant 0 ... 120 sec

Output 2
Temperature error, output current during HOLD



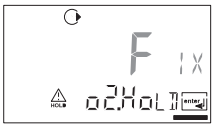
1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Output 2** menu group using arrow keys. All items of this menu group are indicated by the "o2." code.
4 Press **enter** to select menu, edit using arrow keys (see page 43).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

4

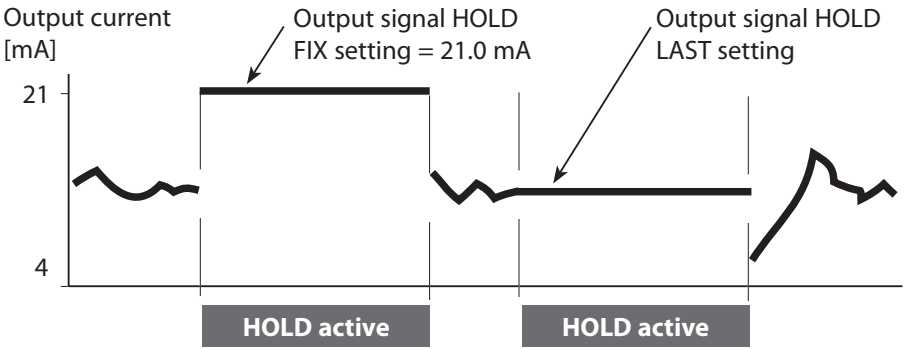
o2.UnIT	Select °C/°F
o2. rTD	Select temp probe
o2.rNG	Select 0-20 / 4-20 mA
o2. 4mA	Enter current start
o2.20mA	Enter current end
o2.FtME	Set output filter
o2.FAIL	22 mA for temp error
o2.HoLD	HOLD mode

enter

5 **conf** **enter**

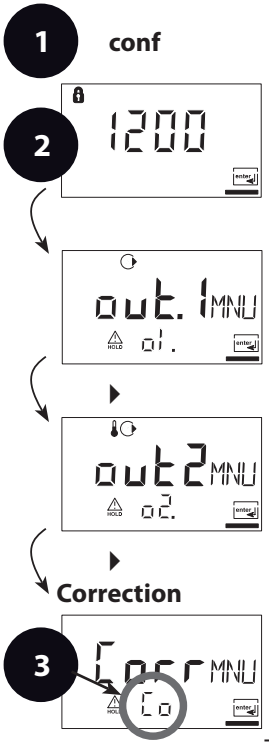
Code	Display	Action	Choices
o2.		22 mA signal for error message Select using ▸ key, press **enter** to proceed.	**OFF** (OFF / ON)
		Output signal during HOLD LAST: During HOLD the last measured value is maintained at the output FIX: During HOLD a value (to be entered) is maintained at the output Select using ▸ key, press **enter** to proceed.	**LAST** (LAST / FIX)
	 	Only with FIX selected: Enter current which is to flow at the output during HOLD Select position using ▸ key and edit number using ▴ key. Press **enter** to proceed.	**21.0 mA** (00.0 ... 21.0 mA)

Output Signal During HOLD:



Correction

Polarization voltage / Membrane temperature compensation / Process pressure / Salinity correction



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Correction** menu group using arrow keys. All items of this menu group are indicated by the "Co." code.
4 Press **enter** to select menu, edit using arrow keys (see page 45).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

4

Co.UPOL	Polarization voltage
Co.CAp	Membrane temperature compensation
Co.UnIT	Meas. unit (pressure)
Co.PrES	Process pressure
Co.SAL	Salinity correction

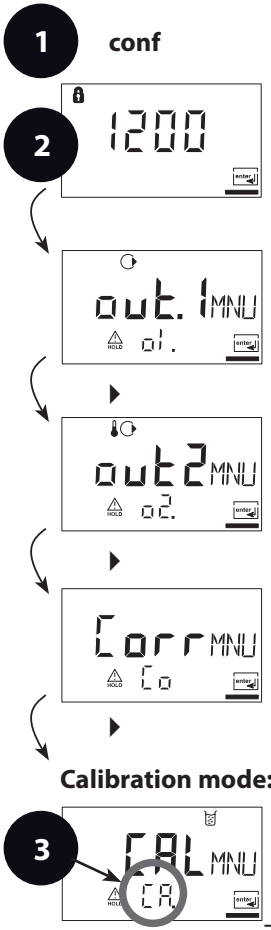
enter

5 **conf** **enter**

Code	Display	Action	Choices
Co.		Enter polarization voltage Select using ▸ key, edit number using ▴ key. Press **enter** to proceed.	**0675 mV**
		Membrane temperature compensation Select position using ▸ key and edit number using ▴ key. Press **enter** to proceed.	**01.00**
		Select pressure unit Select using ▸ key, press **enter** to proceed.	**bar** (kPa, PSi)
		Process pressure correction Enter process pressure. This value is used to correct the oxygen saturation. It has no influence on concentration measurement (Conc). Select position using ▸ key and edit number using ▴ key. Press **enter** to proceed.	**1.013 bar**
		Enter salinity correction Select position using ▸ key and edit number using ▴ key. Press **enter** to proceed.	**00.00 ppt*** * ppt (parts per thousand) - corresponds to g/kg

Please note:
When using a sensor with a polarization voltage different from 675 mV (factory setting), you must enter the correct voltage before connecting the sensor!
Otherwise the sensor may be damaged!

Calibration Mode



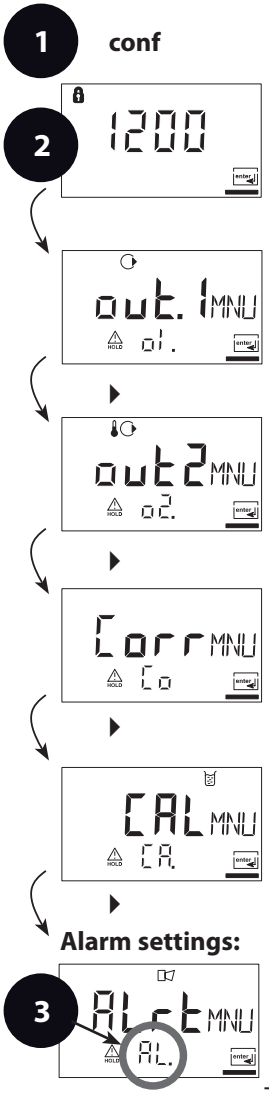
1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Calibration mode** menu group using arrow keys. All items of this menu group are indicated by the "CA." code.
4 Press **enter** to select menu, edit using arrow keys (see page 47).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

Code	Display	Action	Choices
CA.		Specify calibration mode (calibration to saturation or concentration) Select using ▸ key, press **enter** to proceed.	**SAt** (Conc)
		Cal timer interval The cal timer reminds you to calibrate in time. Select using ▸ , edit number using ▲ key. Press **enter** to proceed.	**0000 h** (0 ... 9999 h)

Please note:
When calibrating in air-saturated water (standard practice for biotechnological processes), you should select calibration to saturation (SAT).

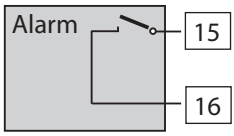
If the sensor can be removed for calibration, however, we recommend the easier and more precise calibration in air. To do so, you have to set the calibration mode to Concentration (Conc), see also page 59.

Alarm Settings



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Alarm settings** menu group using arrow keys. All items of this menu group are indicated by the "AL." code.
4 Press **enter** to select menu, edit using arrow keys (see page 49).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

Code	Display	Action	Choices
AL.		Select Sensocheck (continuous monitoring of sensor) Select using ▸ key, press **enter** to proceed.	**OFF** (ON / OFF)



Alarm Contact

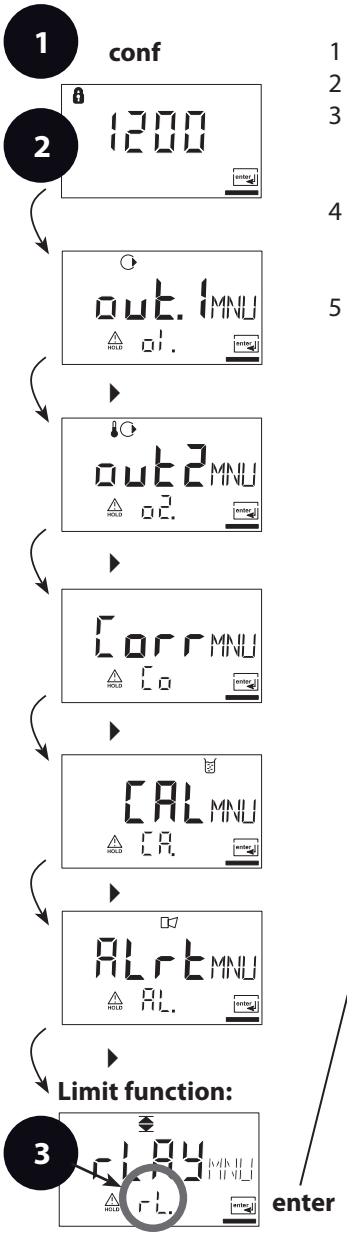
The alarm contact is closed during normal operation (N/C). It opens in the case of alarm or power outage. As a result, a failure message is provided even in the case of line breakage (fail-safe behavior).
For contact ratings, see Specifications.

Error messages can also be signaled by a 22 mA output current (see page 36, 42, 72).

The operating behavior of the alarm contact is shown on page 75.

The **alarm delay** acts on the LED, the 22 mA signal and the alarm contact.

Limit Function
Relay



1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Limit function** menu group using arrow keys. All items of this menu group are indicated by the "L1." code.
4 Press **enter** to select menu, edit using arrow keys (see page 51).
Confirm (and proceed) by pressing **enter**.
5 Exit: Press **conf**, then **enter**.

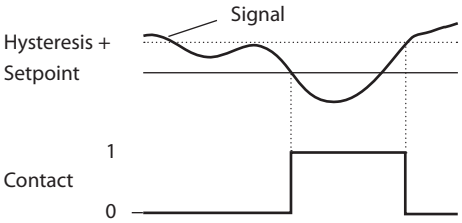
L1.FCT	Contact function
L1.tYP	Contact response
L1.LEVL	Enter setpoint
L1.HYS	Enter hysteresis
L1.dLY	Delay

4 **enter**

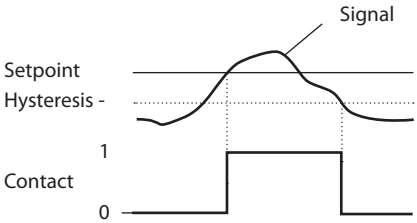
5 **conf** **enter**

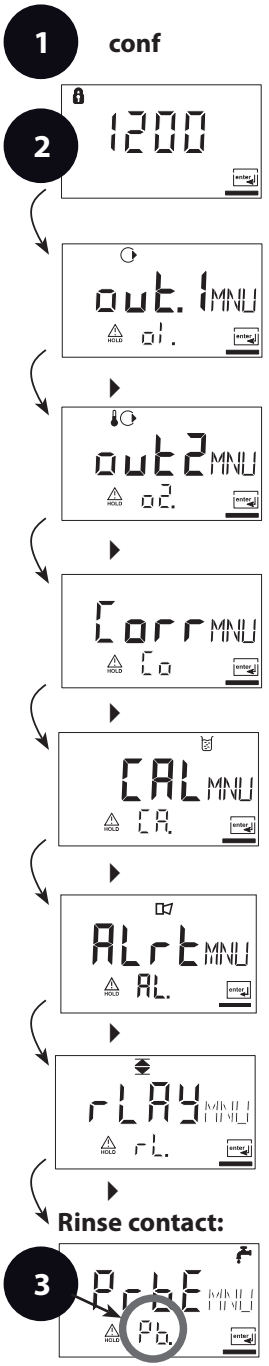
Code	Display	Action	Choices
L1.		Contact function (see below for function principle) Select using ▸ key, press **enter** to proceed.	**Lo** (Lo/Hi)
		Contact response N/C: normally closed contact N/O: normally open contact Select using ▸ key, press **enter** to proceed.	**N/C** (N/O N/C)
		Setpoint Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**000.0 %** (xxx.x %)
		Hysteresis Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**001.0 %** (xxx.x %)
		Delay The contact is activated with delay (deactivated without delay) Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	**0010 sec** (0 ... 600 sec)

Limit Lo



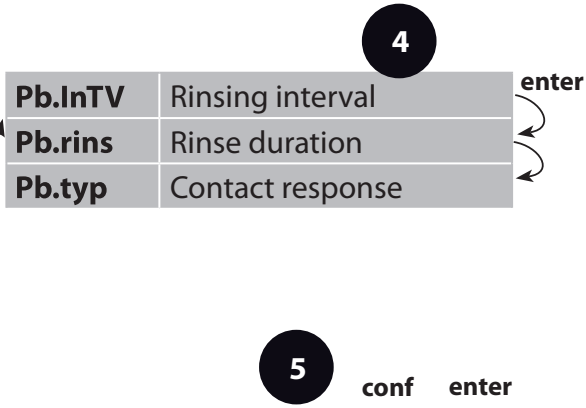
Limit Hi





Controlling a Rinsing System
"Clean" contact

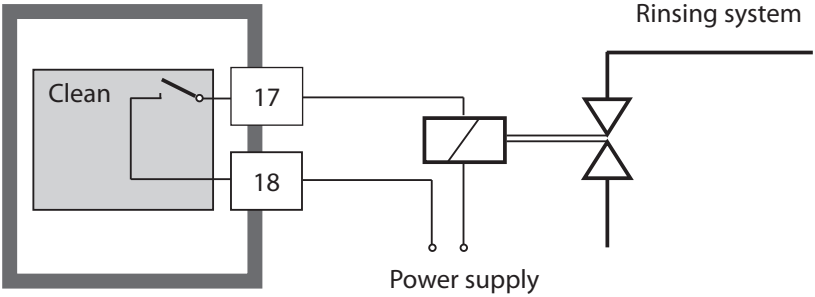
1 Press **conf** key.
2 Enter passcode **1200**.
3 Select **Rinsing probes** menu group using arrow keys. All items of this menu group are indicated by the "Pb." code.
4 Press **enter** to select menu, edit using arrow keys (see next page).
Confirm (and proceed) using **enter**.
5 Exit: Press **conf**, then **enter**.



Code	Display	Action	Choices
Pb.		Rinsing interval Select using ▸ key, enter number using ▲, press **enter** to proceed.	**0.000 h** (x.xxx h)
		Rinse duration Select using ▸ key, enter number using ▲, press **enter** to proceed.	**0060 s** (xxxx s)
		Contact response N/C: normally closed contact N/O: normally open contact Select using ▸, press **enter** to proceed.	**N/C** (N/O)

Connecting a Rinsing System

The "Clean" contact can be used to connect a simple rinsing system.
Rinse duration and rinsing interval are defined during configuration.



Factory Settings of Parameters

Activation:
Simultaneously press **conf** + right arrow key and
enter passcode "4321".
The lower display line reads "Clear". To prevent accidental resetting, "NO" is set as default (blinking in the main display). Press one of the arrow keys to select "YES" and confirm by pressing **enter**.

Caution!
Your data (also calibration data) will be overwritten by the factory settings!

Code	Parameter	Factory setting
o1.SnSR	Sensor type	A
o1.UnIT	%, mg/l, ppm	%
o1. rNG	0/4-20 mA	4-20 mA
o1. 4mA	Current start	0000 %
o1.20mA	Current end	0200 %
o1.FtME	Filter time	0 s
o1.FAIL	22mA signal	OFF
o1.HoLD	HOLD response	Last
o1.FIX	Fix current	021.0 mA
o2.UnIT	Unit °C / °F	°C
o2.rTD	Temp probe	22NTC
o2.rNG	0/4 ...20mA	4-20 mA
o2. 4mA	Current start	000.0 °C
o2.20mA	Current end	100.0 °C
o2.FtME	Filter time	0 s
o2.FAIL	22mA signal	OFF
o2.HoLD	HOLD response	Last
o2.FIX	Fix current	021.0 mA

Code	Parameter	Factory setting
Co.UPOL	Polarization voltage	675 mV
Co.CAp	Membrane temp. compensation	01.00
Co.UnIT	Pressure unit	bar
Co.PrES	Pressure	1.013 bar
Co.SAL	Salinity	00.00 ppt
Ca.MOD	Calibration mode	Sat
CA.tiME	Cal interval	0000 h
AL.SnSO	Sensocheck	OFF
L1.FCT	Contact function	Lo
L1.tYP	Contact response	N/C
L1.LEVL	Setpoint	0000 %
L1.HYS	Hysteresis	0001 %
L1.dLY	Delay	0010 sec
Pb.InTV	Rinsing interval	000.0 h
Pb.rins	Rinse duration	0060 s
Pb.typ	Contact type	N/C

Please note:
Fill in your configuration data on the following pages.

Please note:
Factory settings for the calibration data are 60.0 nA (slope) and 0.000 nA (zero).

Parameters – Individual Settings

Code	Parameter	Setting
o1.SnSR	Sensor type	
o1.UnIT	%, mg/l, ppm	
o1. rNG	0/4-20 mA	
o1. 4mA	Current start	
o1.20mA	Current end	
o1.FtME	Filter time	
o1.FAIL	22mA signal	
o1.HoLD	HOLD response	
o1.FIX	Fix current	
o2.UnIT	Unit °C / °F	
o2.rTD	Temp probe	
o2.rNG	0/4 ... 20mA	
o2. 4mA	Current start	
o2.20mA	Current end	
o2.FtME	Filter time	
o2.FAIL	22mA signal	
o2.HoLD	HOLD response	

Code	Parameter	Setting
o2.FIX	Fix current	
Co.UPOL	Polarization voltage	
Co.CAp	Membrane temp. compensation	
Co.UnIT	Pressure unit	
Co.PrES	Pressure	
Co.SAL	Salinity	
Ca.MOD	Calibration mode	
CA.tiME	Cal interval	
AL.SnSO	Sensocheck	
L1.FCT	Contact function	
L1.tYP	Contact response	
L1.LEVL	Setpoint	
L1.HYS	Hysteresis	
L1.dLY	Delay	
Pb.InTV	Rinsing interval	
Pb.rins	Rinse duration	
Pb.typ	Contact type	

Calibration

Calibration adjusts the device to the sensor.

Activation	**cal**	Activate by pressing **cal**
		Enter passcode: • Zero point 1001 • Water/Air 1100 Edit parameter using ▸ and ▴. Confirm and proceed by pressing **enter**. (Exit by pressing **cal**, then **enter**.)
HOLD During configuration the device remains in the Hold mode.	 HOLD icon	During calibration the device remains in the Hold mode for reasons of safety. The output current is frozen (at its last value or at a preset fixed value, depending on the configuration), limit and alarm contacts are inactive. Sensoface is off, "Calibration" mode indicator is on.
Input errors		The calibration parameters are checked during the input. In the case of an incorrect input "Err" is displayed for approx. 3 sec. The incorrect parameters cannot be stored. Input must be repeated.
Exit	**enter** **enter**	Exit by pressing **enter** (abort using **cal**). The measured value and Hold are displayed alternately, "enter" blinks. Press **enter** to exit the Hold mode. The measured value is displayed. The output current remains frozen for another 20 sec (HOLD icon on, "hourglass" blinks).

Information on Calibration
It is always recommended to calibrate in air.
Compared to water, air is a calibration medium which is easy to handle, stable, and thus safe. In the most cases, however, the sensor must be dismounted for a calibration in air. When dealing with biotechnological processes which require sterile conditions, the sensor cannot be removed for calibration. Here, calibration must be performed with aeration directly in the process medium (e.g. after sterilization). In the field of biotechnology, for example, often saturation is measured and calibration is performed in the medium for reasons of sterility. For other applications where concentration is measured (water control etc.), calibration in air has proved to be useful.

Common Combination:
Process Variable / Calibration Mode / Calibration Medium

Process variable	Cal mode	Calibration	Default rel. humidity	Default cal pressure
Saturation (%)	SAT	Water	100 %	Process pressure
Concentration (mg/l, ppm)	Conc	Air	50 %	1.013 bar

The calibration procedures for these two common applications are described on the following pages. Of course, other combinations of process variable and calibration mode are possible.

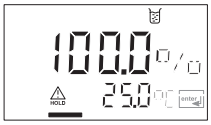
Please note:
When a 2-point calibration is required, the zero calibration should be performed prior to saturation or concentration calibration, resp.
All calibration procedures must be performed by trained personnel.

See page 30 for setting the process variable.

See page 46 for setting the calibration mode.

Calibration to Percent Saturation (SAT), in Water

Display	Action	Remark
	Press **cal** key, enter code 1100. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	SAT or Conc calibration is selected during configuration. Device switches to Hold mode. If an invalid code is entered, the device returns to measuring mode.
	Immerse sensor in cal medium Start by pressing **enter**.	
	Enter relative humidity Select using ▸, enter number using ▲. Press **enter** to confirm entry.	Default for relative humidity in aqueous media: rH = 100 %
	Enter calibration pressure Select using ▸, enter number using ▲. Press **enter** to confirm entry.	Default for calibration pressure is the process pressure configured
	Automatic drift check Display of sensor current (related to 25 °C and 1013 mbars normal pressure) and measuring temperature. If the sensor does not stabilize within 12 minutes, calibration will be aborted.	Drift check can be stopped after > 10 sec by pressing **cal** (accuracy reduced).

Display	Action	Remark
	Enter setpoint value for saturation Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	Default: last value entered
	Display of new calibration values (related to 25°C at 1013 mbars). Ther zero point remains unchanged, for zero calibration see page 67. Exit calibration by pressing **enter**.	New calibration: Press **cal** key.
	Place sensor in process. The percent saturation is shown in the main display alternately with “Hold”; “enter“ blinks. Exit by pressing **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Information on Saturation Calibration (SAT) in Water

- The calibration medium should be water which is in equilibrium with the ambient air (percent saturation 100%). Oxygen exchange between water and air is very slow, however.
- If the calibration medium is not in equilibrium with air and the percent saturation is known from a simultaneous measurement, it can be entered manually.
- For 2-point calibration, perform zero calibration first!

Calibration to Concentration (Conc), in Air

Display	Action	Remark
	Press **cal** key, enter code 1100. Press ▸ key to select position, enter number using ▲ key. Press **enter** to proceed.	SAT or Conc calibration is selected during configuration. Device switches to Hold mode. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in air Press **enter** to start.	
	Enter relative humidity Press ▸ key to select position, enter number using ▲ key. Press **enter** to proceed.	Default for relative humidity in air: rH = 50 %
	Enter calibration pressure Press ▸ key to select position, enter number using ▲ key. Press **enter** to proceed.	Default for calibration pressure is normal pressure 1.013 bars.
	Automatic drift check Display of input current (related to 25 °C and 1013 mbars) and measuring temperature. If the sensor does not stabilize within 12 minutes, calibration will be aborted.	Drift check can be stopped after > 10 sec by pressing **cal** (accuracy reduced).

Display	Action	Remark
	Enter default for concentration Press ▸ key to select position, enter number using ▴ key. Press **enter** to proceed.	Default value is calculated from rel. humidity, cal pressure, and cal temperature (the unit of measurement, ppm or mg/l, is preset during configuration).
	Display of new slope and zero point (related to 25 °C at 1013 mbars) Exit calibration by pressing **enter**.	New calibration: Press **cal** key.
	Place sensor in process. The new value for concentration is shown in the main display alternately with "Hold"; "enter" blinks. Exit by pressing **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Information on Concentration Calibration (Conc):
Calibration in air. This calibration method is recommended when the sensor can be removed for calibration. Air has a stable oxygen content. Therefore the adjustment processes during calibration run more quickly.

- For 2-point calibration, perform zero calibration first.

Zero Calibration

The sensor models SE 703 and SE 706 have a low zero current. Therefore, you should not perform a zero calibration with Stratos Eco 2405. If you still wish to perform a zero calibration, the sensor should remain for at least 10 to 30 minutes in an **oxygen-free** calibration medium in order to obtain stable, non-drifting values. During zero calibration, a drift check is not performed. Zero current of a properly functioning sensor is notably less than 0.5 % of air current. The display (secondary: measured value, main: entered value) does not change until an input current is entered for the zero point, see page 65. When measuring in an oxygen-free medium, the displayed current can be taken directly.

Display	Action	Remark
	Select calibration (press **cal** key). Enter passcode 1001. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed.	Device is in the Hold mode. If an invalid code is entered, the device returns to measuring mode.
	Place sensor in oxygen-free medium. Press **enter** to proceed.	
	Main display: Zero current. Press **enter** to save this value or correct using arrow keys and then save by pressing **enter**. Secondary display: Sensor current measured Press **enter** to proceed.	
	Display of slope Display of new zero current Exit calibration by pressing **enter** key, re-place sensor in process.	New calibration: Press **cal**.
	The oxygen value is shown in the main display alternately with "Hold", "enter" blinks. Stop Hold by pressing **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Product Calibration
Calibration by comparison

During product calibration the sensor remains in the process.
The measurement is only interrupted briefly.

Procedure: The currently measured value is stored in the device for comparison. The comparison value is measured on the site, e.g. using a portable DO meter in a bypass. This value is then entered in the device. The new value for slope or zero is calculated from the stored value and the comparison value. From the measured value, the device automatically recognizes whether a new slope or zero must be calculated (above approx. 5 % saturation: slope, below: zero). The following describes a product calibration with slope correction – a product calibration with zero correction is performed correspondingly.

Display	Action	Remark
	Press **cal** key, enter code 1105. Press ▸ key to select position, enter number using ▴ key, confirm by pressing **enter.**	The type of product calibration (SAT or Conc) is selected during configuration (process variable). If an invalid code is entered, the device returns to measuring mode.
		Display (approx. 3 sec)

Display	Action	Remark
	Save currently measured value. Press **enter** to proceed.	Perform reference measurement.
	Enter the reference value. Confirm by pressing **enter**.	Calculation of new slope
	Display of new slope or new zero (related to 25 °C and 1013 mbars). Exit calibration by pressing **enter**.	New calibration: Press **cal**.
	The new measured value is shown in the main display alternately with “Hold”, “enter” blinks. Exit by pressing **enter**.	After end of calibration, the outputs remain in Hold mode for approx. 20 sec.

Display	Action	Remark
	Select calibration Press **cal** key, enter code 1015. Press ▸ key to select position, enter number using ▲ key, confirm by pressing **enter**.	Wrong settings change the measurement properties! If an invalid code is entered, the device returns to measuring mode.
	Ready for calibration Measure the temperature of the process medium using an external thermometer.	Device is in Hold mode. Display approx. 3 sec
	Enter measured temperature value. Select using ▸ key, edit number using ▲ key. Press **enter** to proceed. Press **enter** to exit adjustment. HOLD will be deactivated after 20 sec.	The default value is shown in the main display, the currently measured value in the secondary display.

Measurement

Display	Action
	In the measuring mode the main display shows the configured process variable (%, mg/l, or ppm) and the lower display the temperature. During calibration you can return to measuring mode by pressing the **cal** key, during configuration by pressing **conf** (waiting time for signal stabilization approx. 20 sec).

Diagnostics Functions

Display	Action
	Display of output currents Press **enter** while in measuring mode. The current at output 1 is shown in the main display, the current at output 2 in the secondary display. After 5 sec the device returns to measuring mode.
	Display of calibration data (Cal Info) Press **cal** while in measuring mode and enter code 0000. The slope is shown in the main display, the zero point in the secondary display. After 20 sec the device returns to measuring mode (immediate return at pressing **enter**).
	Sensor monitor (display of sensor current) Press **conf** while in measuring mode and enter code 2222. The sensor current (without temperature compensation) is shown in the main display, the measuring temperature in the secondary display. Press **enter** to return to measurement.
	Display of last error message (Error Info) Press **conf** while in measuring mode and enter code 0000. The last error message is displayed for approx. 20 sec. After that the message will be deleted (immediate return to measurement at pressing **enter**).

These functions are used for testing the connected peripherals.

Display	Action
	Specify current for output 1 Press **conf** while in measuring mode and enter code 5555. The main display indicates the current provided by output 1. This value can be edited. To do so, select the position using ▸ key, edit number using ▲ key. Confirm entry by pressing **enter**. The entered value will be shown in the secondary display. The device is in Hold mode. The specified current is output. Press **conf**, then **enter** to return to measurement (Hold remains active for another 20 sec).
	Specify current for output 2 Press **conf** while in measuring mode and enter code 5556. The main display indicates the current provided by output 2. This value can be edited. To do so, select the position using ▸ key, edit number using ▲ key. Confirm entry by pressing **enter**. The entered value will be shown in the secondary display. The device is in Hold mode. The specified current is output. Press **conf**, then **enter** to return to measurement (Hold remains active for another 20 sec).

Error Messages (Error Codes)

Error	Display	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 01	Measured value blinks	**SAT range** • Sensor defective • Wrong sensor connected • Measurement range exceeded	x	x	x	
ERR 02	Measured value blinks	**Conc range** • Sensor defective • Wrong sensor connected • Measurement range exceeded	x	x	x	
ERR 98	"Conf" blinks	**System error** Configuration or calibration data defective; completely reconfigure the device using the factory settings. Then calibrate. Memory error in device program	x	x	x	x
ERR 99	"FAIL" blinks	**Factory settings** EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.	x	x	x	x

Error	Icon (blinks)	Problem Possible causes	Alarm contact	Red LED	Out 1 (22 mA)	Out 2 (22 mA)
ERR 03		**Temperature probe** Open or short circuit Temperature range exceeded	x	x	x	x
ERR 11		**Current output 1** Current below 0 (3.8) mA	x	x	x	
ERR 12		**Current output 1** Current above 20.5 mA	x	x	x	
ERR 13		**Current output 1** Current span too small / too large	x	x	x	
ERR 21		**Current output 2** Current below 0 (3.8) mA	x	x		x
ERR 22		**Current output 2** Current above 20.5 mA	x	x		x
ERR 23		**Current output 2** Current span too small / too large	x	x		x
ERR 33		**Sensocheck:** Sensor: Connecting cable defective	x	x	x	
		• Zero error, Sensoface active, see page 77				
		• Slope error, Sensoface active, see page 77				
		• Response time exceeded, Sensoface active, see page 77				
		• Calibration interval expired, Sensoface active, see page 77				

Calibration Error Messages

Icon blinks:	Problem Possible causes
	Slope out of range Wrong calibration values specified (relative humidity, pressure, saturation, concentration)
 In addition “CAL Err” blinks.	**Calibration aborted after 12 minutes** Sensor defective or dirty • No electrolyte in the sensor • Sensor cable insufficiently shielded or defective • Strong electric fields influence the measurement • Temperature fluctuation of calibration solution

Operating States

Operating status	Out 1	Out 2	Relay 1 limit value	Alarm contact	Cleaning contact	Timeout
Measure	■	■	■	■		
Cal Info (cal) 0000	■	■	■	■		20 s
Error Info (conf) 0000	■	■	■	■		20 s
Calibration (cal) 1100	■	■				
Temp adjustment (cal) 1015	■	■				
Product calibration (cal) 1105	■	■				
Configuration (conf) 1200	■	■				20 min
Sensor monitor (conf) 2222	■	■	■	■	■	20 min
Current source 1 (conf) 5555	■	■				20 min
Current source 2 (conf) 5556	■	■				20 min
Rinsing function					■	

■ active

■ as configured (Last/Fix or Last/Off)

(Sensocheck must have been activated during configuration.)

The smiley in the display (Sensoface) alerts to sensor problems (defective cable, maintenance request). The permitted calibration ranges and the conditions for a friendly, neutral or sad Sensoface are summarized in the following chart. Additional icons refer to the error cause.
Replace membrane module or filling solution, if required.

Type A Sensors (SE 703, SE 706)

	Slope	Zero point	Response time	Cal timer
Permitted range	25 ... 130 nA	-2 ... +2 nA	max. 720 s	
	> 35 ... < 90 nA	> -0.3 ... < 0.3 nA	≤ 300 s	≤ 80 %
	 30 ... 35 nA or 90 ... 110 nA	 -0.6 ... -0.3 nA or +0.3 ... +0.6 nA	 300 ... 600 s	 80 ... 100 %
	 < 30 nA or > 110 nA	 < -0.6 nA or > +0.6 nA	 > 600 s	 Timer expired

Notice
The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad"). To reset the Sensoface indicator, the defect must be remedied.

Type B Sensors (Sensors with Higher Current)

	Slope	Zero point	Response time	Cal timer
Permitted range	200 ... 550 nA	-2 ... +2 nA	max. 720 s	
☺	> 250 ... < 500 nA	> -0.5 ... < 0.5 nA	< 300 s	< 80 %
☺	 225 ... 250 nA or 500 ... 525 nA	 -1.0 ... -0.5 nA or +0.5 ... +1.0 nA	 300 ... 600 s	 80 ... ≤ 100 %
☹	 < 225 nA or > 525 nA	 < -1.0 nA or > +1.0 nA	 > 600 s	 Timer expired

Thermometer and Sensoface:
Temperature out of concentration or saturation range

Sensocheck
Continuously monitors the sensor and leads for short circuits or open circuits. Critical values make the Sensoface "sad" and the corresponding icon blinks:

The Sensocheck message is also output as error message Err 33. The alarm contact is active, the red LED is lit, output current 1 is set to 22 mA (when configured correspondingly). Sensocheck can be switched off during configuration (then Sensoface is also disabled).
Exception: After a calibration a smiley is always displayed for confirmation.

Product Line and Accessories

Devices	Order No.
Stratos Eco 2405 Oxy	2405 Oxy

Mounting Accessories

Pipe-mount kit	ZU 0274
Panel-mount kit	ZU 0275
Protective hood	ZU 0276
Connector for power supply instead of cable gland, Harting HAN 7D, with male insert	ZU 0271
Connector for current output instead of cable gland, Harting HAN 8U, with female insert	ZU 0272

For more information concerning our sensors and fittings product line, please refer to our "Sensors, Fittings, Accessories" catalog:
Download at http://www.knick.de or request catalog:
Phone: +49 (0)30 - 801 91 - 0
Fax: +49 (0)30 - 801 91 - 200
E-mail: knick@knick.de

DO input

	Measuring current	–2 ... +1800 nA
	Resolution (with $V_{pol} \leq 800$ mV and $V_{ref} \leq 200$ mV)	0.05 nA
	Saturation (-10 ... 80 °C)	0... 200%
	Meas. error[1,2,3)]	0.5 % meas.val. + 0.5 %
	Concentration (-10 ... 80 °C)	0,00 ... 20.00 mg/l 0.00 ... 20.00 ppm
	Meas. error[1,2,3)]	0.5 % meas.val. + 0.05 mg/l or 0.05 ppm
	Permitted guard current	≤ 20 µA
	Polarization voltage *	0 ... 1000 mV
	Factor for membrane temp. compensation *	00.50 ... 03.00
	Process pressure*	0.000 ... 9.999 bars (... 999.9 kPa / ... 145.0 psi)
	Salinity correction*	00.00 ... 45.00 g/kg

Sensor standardization

Operating modes *	• O_2 saturation (automatic) • O_2 concentration (automatic) • Product calibration • Zero calibration	
Calibration range	Zero point	± 2 nA
Sensor Type A	Slope	25 ... 130 nA (at 25 °C, 1013 mbars)
Calibration range	Zero point	± 2 nA
Sensor Type B	Slope	200 ... 550 nA (at 25 °C, 1013 mbars)
Calibration timer *	0000 ... 9999 h	
Pressure correction *	0.000 ... 9.999 bars / 999.9 kPa / 145.0 psi	

Sensor monitoring	
Sensocheck	Monitoring for short circuits / open circuits (can be disabled)
Sensoface	Provides information on the sensor condition (evaluation of zero/slope, response time, calibration interval, Sensocheck)
Temperature input *	NTC 22 kΩ / NTC 30 kΩ 2-wire connection, adjustable
Measuring range	–20.0 ... +150.0 °C / –4 ... +302 °F
Adjustment range	10 K
Resolution	0.1 °C / 1 °F
Meas. error[1,2,3)]	< 0.5 K (< 1 K at > 100°C)
Output 1	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 2)
Process variable*	DO saturation/DO concentration
Overrange *	22 mA in the case of error messages
Output filter *	Low-pass, filter time constant 0 ... 120 s
Measurement error [1)]	< 0.3% current value + 0.05 mA
Start/end of scale	As desired within range
Permissible span	5 ... 200 % / 0.5 ... 20 mg/l (ppm)
Output 2	0/4 ... 20 mA, max. 10 V, floating (galvanically connected to output 1)
Process variable	Temperature
Overrange *	22 mA in case of temp error messages
Output filter *	Low-pass, filter time constant 0 ... 120 s
Measurement error [1)]	< 0.3% current value + 0.05 mA
Start/end of scale *	–20 ... +150 °C / –4 ... +302 °F
Permissible span	20 ... 170 K / 36 ... 306 °F

Specifications

Alarm contact	Relay contact, floating
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response	N/C (fail-safe type)
Response delay	10 s
Limit value	Output via relay contact
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response*	N/C or N/O
Delay *	0000 ... 9999 s
Setpoint*	Within selected range
Hysteresis*	000.0 ... 050.0 % / 00.00 ... 05.00 mg/l (ppm)
Rinsing function	Relay contact, floating, for controlling a simple rinsing system
Contact ratings	AC< 250 V / < 3 A / < 750 VA DC< 30 V / < 3 A / < 90 W
Contact response	N/C or N/O
Rinse interval	000.0 ... 999.9 h (000.0 h = rinsing function switched off)
Rinse duration	0000 ... 1999 s
Display	LC display, 7-segment with icons
Main display	Character height 17 mm, unit symbols 10 mm
Secondary display	Character height 10 mm, unit symbols 7 mm
Sensoface	3 status indicators (friendly, neutral, sad face)
Mode indication	4 mode indicators “meas“, “cal“, “alarm“, “config“ Further icons for configuration and messages
Alarm indication	Red LED in case of alarm
Keypad	5 keys: [cal] [conf] [▸] [▴] [enter]

Service functions	
Current source	Current specifiable for output 1 and 2 (00.00 ... 22.00 mA)
Device self-test	Automatic memory test (RAM, FLASH, EEPROM)
Display test	Display of all segments
Last Error	Display of last error occurred
Sensor monitor	Display of direct, uncorrected sensor signal
Data retention	Parameters and calibration data > 10 years (EEPROM)
Protection against electric shock	Protective separation of all extra-low-voltage circuits against mains by double insulation to EN 61010-1
Power supply	24 (–15%) ... 230 V AC/DC (+10%); approx. 5 VA, 2.5 W AC: 45 ... 65 Hz Overvoltage category II, protection class II
Nominal operating conditions	
Ambient temperature	–20 ... +55 °C
Transport/Storage temp	–20 ... +70 °C
Relative humidity	80 % at temperatures up to 55 °C, maximum operating height 2000 m
Power supply	24 (–15%) ... 230 V AC/DC (+10%)
Frequency for AC	45 ... 65 Hz
EMC	EN 61326-1, EN 61326-2-3
Emitted interference	Class B (residential area) Class A for mains > 60 V DC
Immunity to interference	Industry
Explosion protection	
FM	NI Class I Div 2 Group A, B, C & D, T4 Ta = 55 °C; Type 2 NI Class I Zone 2 Group IIC, T4 Ta = 55°C; Type 2
CSA	Class I Div 2 Groups A, B, C and D, T4 Ex nA IIC T4

Enclosure	Molded enclosure made of PBT (polybutyleneterephtalate)
Color	Bluish gray RAL 7031
Mounting	• Wall mounting • Pipe mounting: Ø 40 ... 60 mm ☐ 30 ... 45 mm • Panel mounting, cutout to DIN 43 700, sealed against panel
Dimensions	H 144 mm, W 144 mm, D 105 mm
Ingress protection:	IP 65 / NEMA 4X
Cable glands	3 knockouts for cable glands M20x1.5 2 knockouts for NPT 1/2" or rigid metallic conduit
Weight	Approx.1 kg

* User-defined

1) To IEC 746 Part 1, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

Approvals – Canada

Warnings and Notes to Ensure Safe Operation

Warning!
Do not disconnect equipment unless power has been switched off.

Caution!
Clean only with antistatic moistened cloth.

Caution!
Substitution of components may impair suitability for hazardous locations.

- The equipment shall be installed and protected from mechanical impact and ultraviolet (UV) sources.
- Clean only with a moistened antistatic cloth as potential electrostatic hazard may exist. Service equipment only with conductive clothing, footwear and personal grounding devices to prevent electrostatic accumulation.
- Internal grounding provisions shall be provided for field wiring. Bonding between conduit shall be provided during installation, and all exposed non-current carrying metallic parts shall be bonded and grounded.
- Installation in a ClassI, Division 2 or Class I, Zone 2 hazardous location shall be in accordance with the Canadian Electrical Code (CEC Part 1) Section 18 Division 2 wiring methods.
- The equipment shall have a switch or circuit breaker in the building installation (that is in close proximity to the equipment) that is marked as the disconnect switch.
- The enclosure Type 2 is only for indoor use.
- The mains supply voltage fluctuations should not exceed -15/+10 percent of the nominal supply voltage.
- The device shall not be used in a manner not specified by this manual.

Caution!
Use supply wires suitable for 30 °C above ambient and rated at least 250 V.

Caution!
Use signal wires suitable for at least 250V.

OBSERVE THE SPECIFICATIONS OF THE CONTROL DRAWING!

CSA Control Drawing

Copying of this document and giving it to others and use or communication for the contents therefor, are forbidden without express authority.

Hazardous Location

Class I Divison 2, Groups A, B, C, D T4
Ex nA IIC T4 CSA 02.1342049X

Enclosure Type 2, Tamb = - 20 °C to + 55 °C

pH/ORP measuring circuit (Terminals KL. 1, 2, 3, KL. C)	maximum values:	V_{oc} = 10 V I_{sc} = 12 mA P_o = 15 mW	C_a = 20 µF L_a = 1 H
or DO measuring circuit (Terminals KL. 1, 2, 3, 4, 5, KL. C)	maximum values:	V_{oc} = 10 V I_{sc} = 17 mA P_o = 22 mW	C_a = 20 µF L_a = 1 H
or Cond measuring circuit (Terminals KL. 1, 2, 3, 4, 5)	maximum values:	V_{oc} = 10 V I_{sc} = 112 mA P_o = 140 mW	C_a = 20 µF L_a = 8 mH
or Condl measuring circuit (Terminals KL. 1, 2, 3, 4, 5)	maximum values:	V_{oc} = 7.1 V I_{sc} = 72 mA P = 128 mW	C_a = 100 µF L_a = 20 mH
Temp measuring circuit (Terminals KL. D, KL. E)	maximum values:	V_{oc} = 5 V I_{sc} = 10 mA P_o = 13 mW	C_a = 1000 µF L_a = 1 H

Terminals KL. 6, 7 and 8
Do not connect

TERMINALS 1, 2, 3, 4, 5, C, D, E:
NON-INCENDIVE FIELD WIRING CONNECTIONS FOR CLASS I, DIVISION 2, GROUPS A, B, C, D

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISON 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISON 2

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMEMT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

WARNING - CLEAN WITH MOISTENED CLOTH ONLY

WARNING - BONDING BETWEEN CONDUITS IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION: SEE INSTALLATION INSTRUCTION

Weitergabe sowie Vervielfältigung dieser Unterlage, Verwertung und Mitteilung ihres Inhalts nicht gestattet, soweit nicht ausdrücklich zugestanden.

4 3 2 1

Stratos Transmitter 2405

Stratos Eco 2405 pH one pH/ORP input
Stratos Eco 2405 Oxy one DO input
Stratos Eco 2405 Cond one Conductivity input for 2-/4-electrode sensors
Stratos Eco 2405 CondI one Conductivity input for electrodeless conductivity sensors

F

20 Power supply circuit
(Terminals Kl. 19, 20)
19 20 to 253 V AC/DC, approx. 5 VA

18

17 Switching circuits
Clean (Terminals KL. 17, 18)
ALARM (Terminals KL. 15, 16)
maximum values:
16 AC: < 253 V / < 3 A / <750 VA / resistive load
DC: < 30 V / < 3 A / < 90 W / resistive load

15

14 Terminal KL. 14
Do not connect

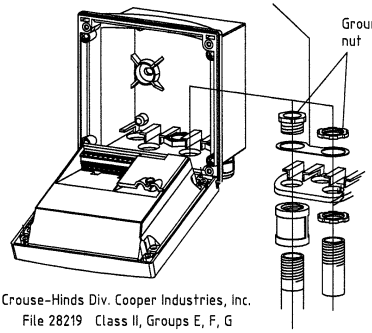
Switching circuit
13 REL. 1 (Terminals KL. 12, 13)
maximum values:
12 AC: < 253 V / < 3 A / <750 VA / resistive load
DC: < 30 V / < 3 A / < 90 W / resistive load

11 Output circuits
OUT 1 and OUT 2 (Terminals KL. 9, 10 and 11, 10)
10 maximum values:
V_{oc} = 10 V C_a = 10 µF
I_{sc} = 22 mA L_a = 100 mH
9 P_o = 220 mW

E

Conduit mounting:

Place washer between enclosure and nut



D

Crouse-Hinds Div. Cooper Industries, Inc.
File 28219 Class II, Groups E, F, G
HUB BASIC SCRU-TITE: ST-1, STA-1
GROUND HUB: SSTG-1, STG-1, STAG-1
GROUND NUT: STGN-1, STAGN-1
FILE 13046 Class I, Zone 1, Ex e II; IP 66
GROUND HUB BASIC SCRU-TITE: STGK-1, SSTGK-1

Appleton
FILE 208042 Class II, Groups E, F, G
HUBG-50D, HUBL-50D

Thomas & Betts Corporation
FILE 23086 Class I, Div 2
Hub: 370AL, 370
Grounding Bushing: 3870

C

Division 2 Wiring Methods:
The connections of the transmitter are incendive and must be installed in accordance with the Canadian Electrical Code Part I Section 18-Hazardous Locations

B

Verteiler: FUL (2x)				
1	Terminal 17/18	01.09.09	dam	
Nr.	AE	Datum	Bearbeiter	FGL KON

Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m
Oberfläche

	Datum	Name
Bearb.	09.04.08	dam
Gepr.(KON)	2.9.09	
Freigabe(FGL)	2.9.09	

Schutzvermerk nach ISO 16016 beachten

Maßstab
Blatt 1
Halbzeug
Benennung
control drawing CSA
Stratos Eco 2405
Zeichnungsnummer
194.130-330
Ungültig ab:
Ersetzt durch:

A

Index

22 mA signal for error message 37, 43

A

Accessories 81
Alarm contact 49
Alarm setings 25, 48
Approvals 88
Assembly 10

C

Calibration 58
- Calibration mode selection 46
- Calibration to concentration (Conc) 62
- Calibration to percent saturation (SAT) 60
- Cal timer interval 46
- Error messages 74
- Product calibration 66
- Zero calibration 64

Cal Info 70
"Clean" contact 52
Concentration calibration 62
Configuration 26
- Menu structure 27

Configuration: Alarm settings 48
Configuration: Calibration mode 46
Configuration: Correction 44
Configuration: Limit function 50, 52
Configuration: Output 1 30
- Output current during Error and HOLD 36
- Output current range 32
- Process variable 30
- Sensor type 30
- Time constant of output filter 34

Configuration: Output 2 38
- Output current 38
- Output current during HOLD 42

Temperature 38
Temperature error 42
Time constant of output filter 40
Configuration: Rinsing probes 52
Connection 14
CSA Control Drawing 90
CSA warnings and notes 88
Current start / end 33, 39

D
Device self-test 23
Diagnostics functions 70
Display of calibration data 70
Display of last error message 70
Display of output currents 70
Display of sensor current 70
Specifying the output current 71
Display 21
Disposal 2
Division 2 wiring 15
Documentation 8

E
Error Info 70
Error messages 72
Display of last error message 70
Explosion protection 85

F
Factory settings of parameters 54
Front panel 20

H
HOLD mode 24
Output signal during HOLD 37, 43
Hysteresis 51

I
Installation 14
Intended use 7

K
Keypad 22

M
Measurement 69
Mounting plan 11

O
Operating states 75
Output filter 34, 40
Overview 9
Overview of configuration steps 28

P
Package contents 10
Panel mounting 13
Panel-mount kit 13
Parameters
    Factory settings 54
    Individual settings 56
Passcodes 96
Pipe mounting 12
Pipe-mount kit 12
Polarization voltage 45
Pressure correction 45
Product calibration 66
Product line 81
Protective hood 12
Protective wiring 18

R
Relay 50, 52
Relay contacts 18

Rinse contact 52
Rinsing interval 53
Rinsing probes 52
Rinsing system 53

S
Safety information 5, 88
Salinity correction 45
Self-test 23
Sensocheck 23, 48, 79
    Configuration 49
Sensoface 23, 77, 79
Sensor connection 17
Sensor monitor 70
Short instructions 8
Specifications 82

T
Temperature measurement, configuration 39
Temperature probe adjustment 69
Terminal assignments 14
Time constant of output filter 35, 41
Trademarks 7

U
User interface 20

W
Warranty 2
Wiring example 17

Z
Zero calibration 64

Passcodes

Calibration

Key + passcode	Menu item	Page
cal + 0000	CAL info (display of zero,slope)	70
cal + 1001	Zero calibration	64
cal + 1100	Calibration (water / air)	60
cal + 1105	Product calibration	66
cal + 1015	Temp probe adjustment	69

Configuration

Key + passcode	Menu item	Page
conf + 0000	Error info (display of last error, erase)	70
conf + 1200	Configuration	26
conf + 2222	Sensor monitor (sensor current)	70
conf + 5555	Current source 1 (specify output current)	71
conf + 5556	Current source 2 (specify output current)	71
conf + ⏭ 4321	Factory setting	54